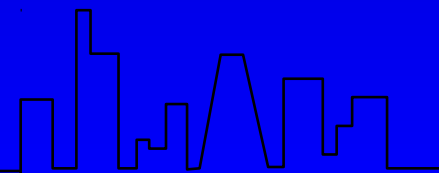




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Modern Transportation Flood Impact Analysis





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The Chicago District Approach

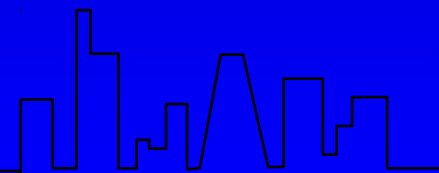
Presented by:

Dennis Giba,

CELRC-PM-PL-F

Dennis.J.Giba@lrc02.usace.army.mil

312-846-5593



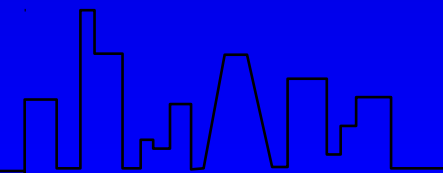


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Approved Projects

Traffic impact analysis made a significant contribution to project economic justification for:

- Little Calumet River, IN Flood Damage Reduction
- Chicago Shoreline, IL Storm Damage Reduction
- Des Plaines River, IL Flood Damage Reduction



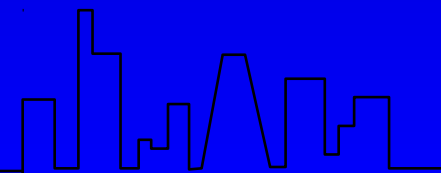


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Previous Studies

Methodology

- Featured manual calculations
- Captured primary effects – roads directly impacted by flooding
- Missed secondary effects – roads bearing increased loads
- Main problem was rapidly increasing computational complexity





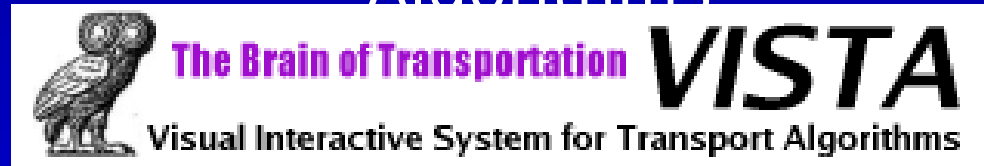
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Current Studies

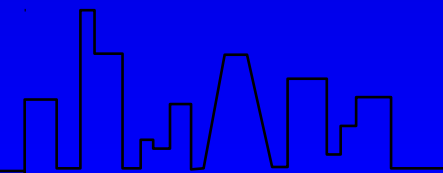
A New Approach:

VISTA

Visual Interactive System for Transport
Algorithms



Northwestern
University,
Evanston, IL





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What is VISTA?

The Visual Interactive System for Transport Algorithms (VISTA) is an innovative network-enabled framework that provides support for:

- *models,*
- *data-base/warehousing and*
- *reporting,*

all seamlessly integrated for a wide range of transport applications: planning, engineering and operational

It can be accessed via a cross-platform Java client or a web page via the following site

<http://vista.civil.northwestern.edu>



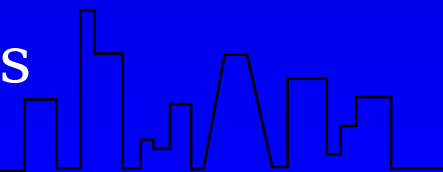


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VISTA Models

1. Traffic Simulation (*RouteSim, DYNASMART*)
2. Dynamic Traffic Assignment (DTA)
 - Dynamic User Equilibrium*
 - Dynamic System Optimum*
 - Dynamic Reactive Routing Strategies*
3. Traffic Signals *Optimization and Warrant Analysis*
4. Routing *One or many users*
5. Transit Operations
 - Transit Route Structure, TSP, Intermodal Routing*
6. Freeway Operations
 - ITS Devices and Strategies, Ramp Metering, VMS, EZ-PASS*
7. Commercial Vehicle Operations





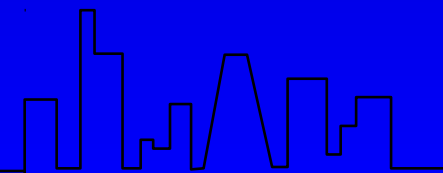
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VISTA Models

All VISTA Models Account for:

- Dynamic traffic conditions
- Individual vehicle routing choices
- Construction zones,
- Incidents (including FLOODS),
- Weather conditions,
- Traffic signals,
- Information Provision Strategies,
- Information provision devices (VMS),
- Detector functionality (including TRANSMIT detectors),
- Multiple vehicle classes with potentially prohibited links for trucks,
- Prohibited turning movements





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VISTA Features

- The pioneering feature of VISTA is that it runs over the network on a cluster of Unix or Linux machines.
- It can be installed at the agency's site and allow its transportation professionals to access the models, data and reports from anywhere, anytime and from any machine without worrying about available computational power of the client machine to run sophisticated *Dynamic Traffic Assignment, Control, and Simulation models*.
- The data can be visualized graphically in a GIS (machine independent) and reports can be produced via a browser.



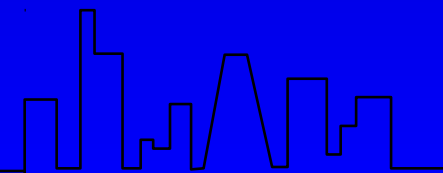
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VISTA

Advantages

- The forefront of research on traffic modeling
 - Handles models and algorithms requiring enormous computational power
 - Handles enormous data needs (the Chicago area network includes over 10 million paths)
 - Web-based user interface
- Accessible from any internet connection





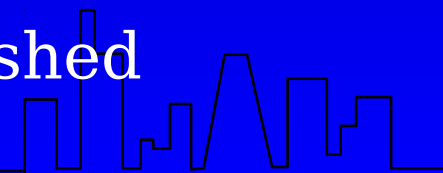
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VISTA

History

- Under development since 1988, NU involved since 1995
- Participants include US Dot, University of Texas, Oak Ridge Natl. Labs, MIT, and Northwestern
- Has undergone extensive professional review
- 60 papers and 50 reports published



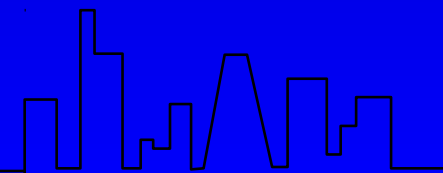


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VISTA – Chicago District Partnership

- ID/IQ Contract in place, up to \$500K /yr
 - Local training for LRC staff
- The VISTA programs and components have undergone Corps ITR
 - NU presentation to HQ and IWR
- Possible designation as CX for traffic studies



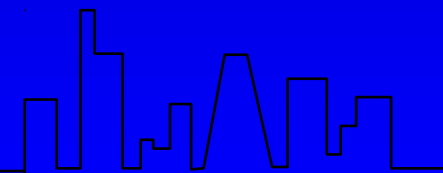


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VISTA – Chicago District Partnership

- The VISTA system has undergone extensive academic and peer review
- The VISTA programs and components have undergone ITR in the context of a Corps study
- The VISTA system has general acceptance for COE studies (Corps application, e.g. computation of benefits based on model outputs subject to ITR)





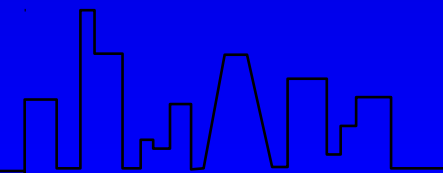
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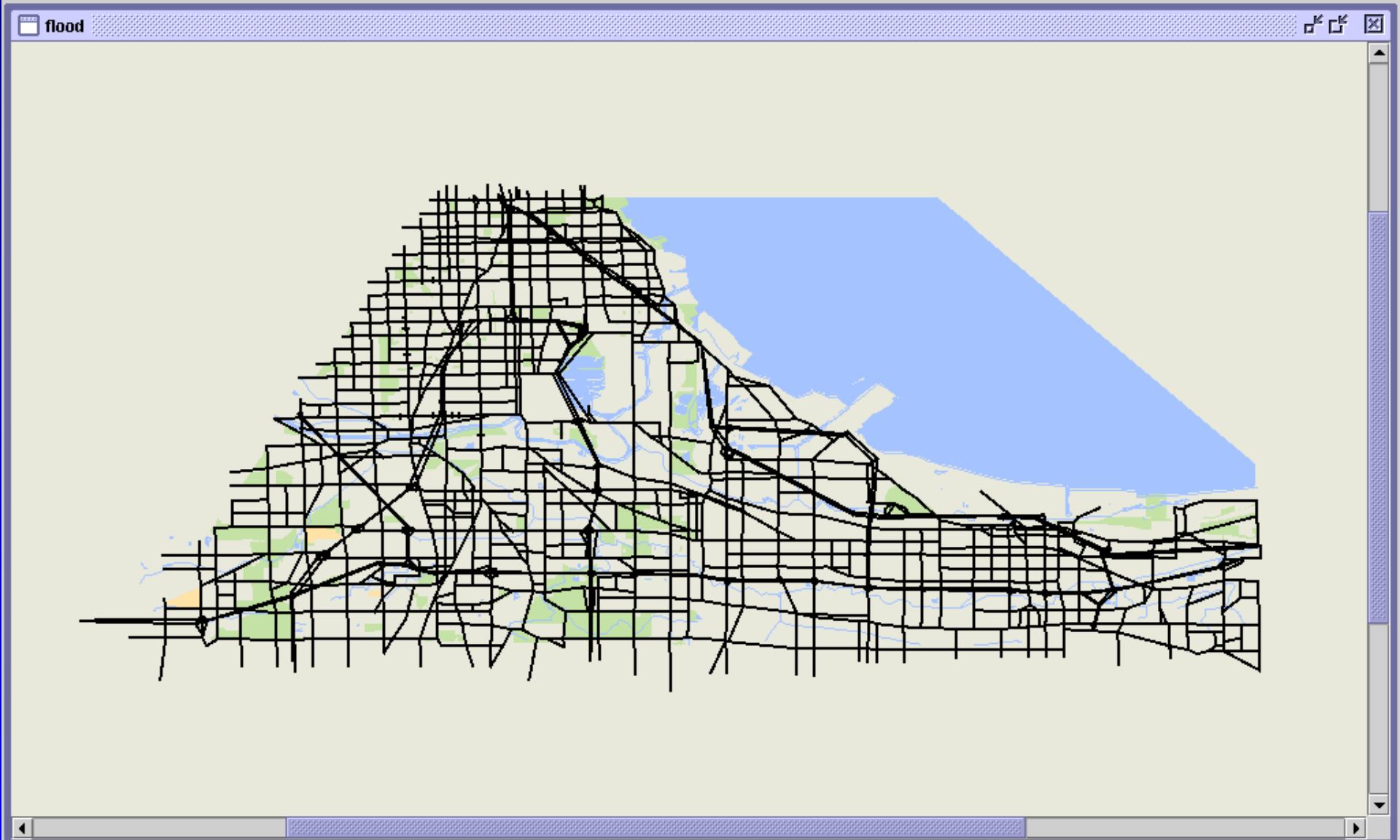


VISTA – Chicago District Partnership

Current Applications:

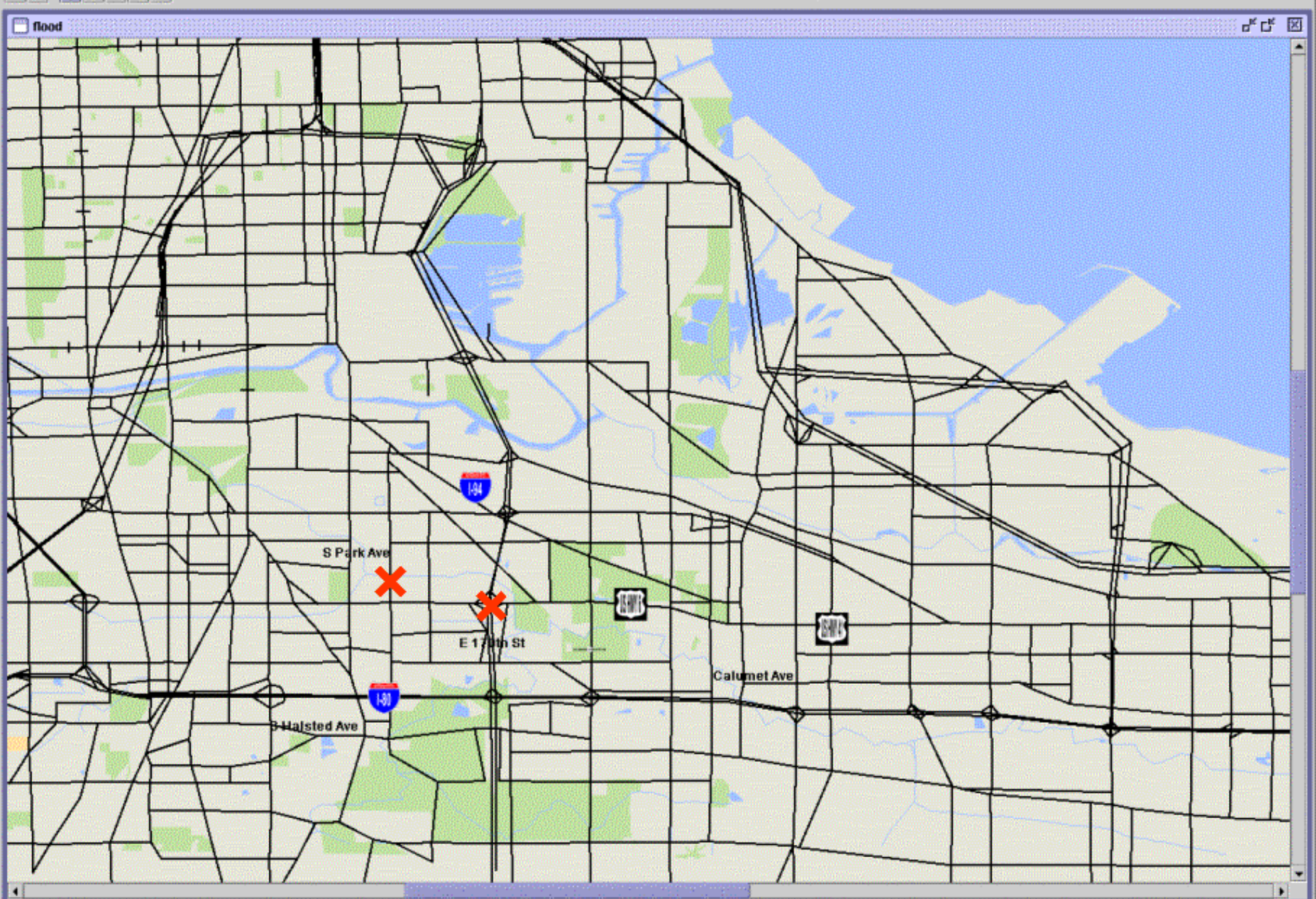
- Thorn Creek, IL FDR project benefits
- North Branch Chicago River Planning Assistance to States
- Des Plaines River, IL River Basin Study
- Mill Creek, OH FDR project benefits



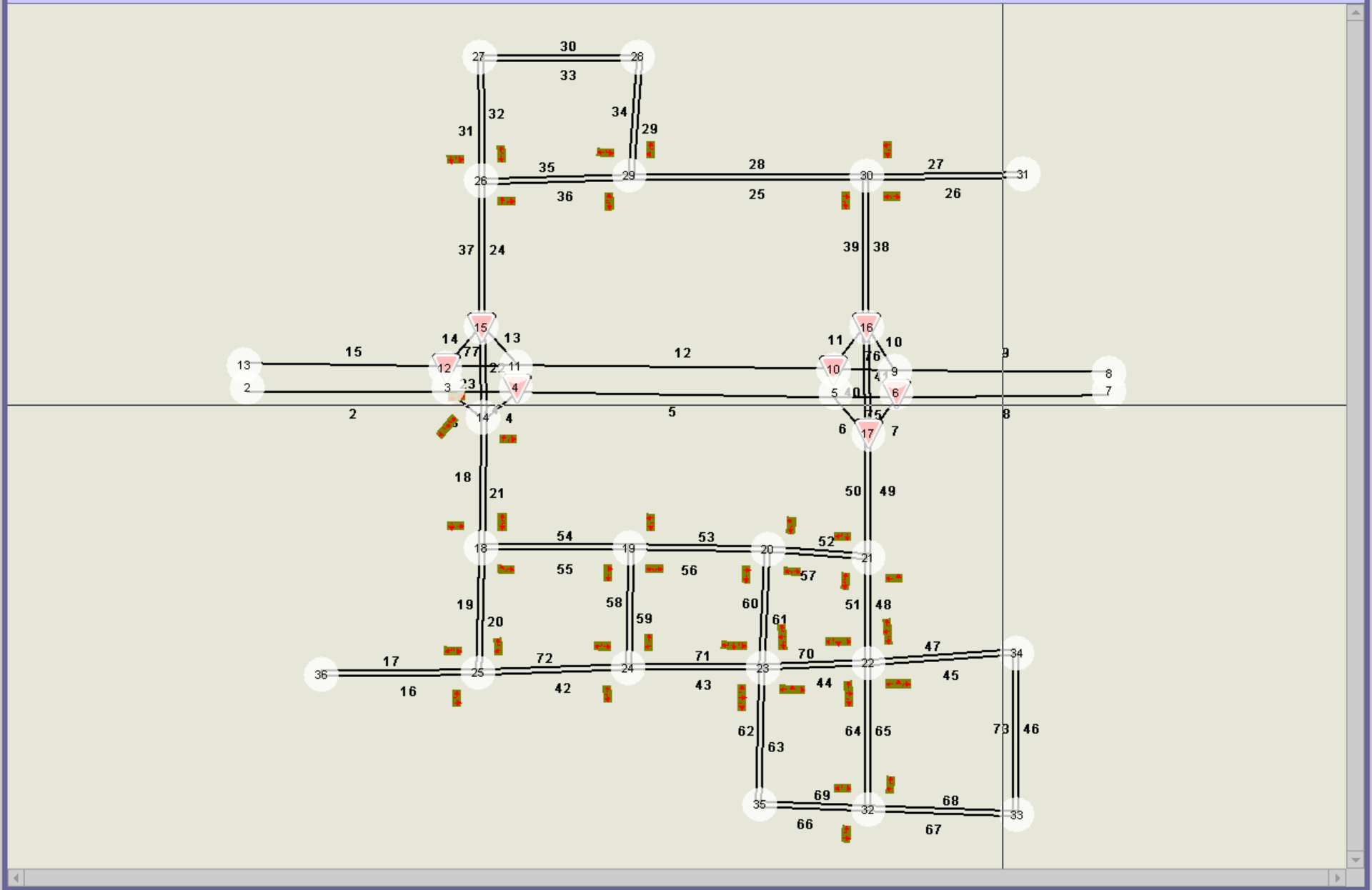


X: -87.2644 Y: 41.4505

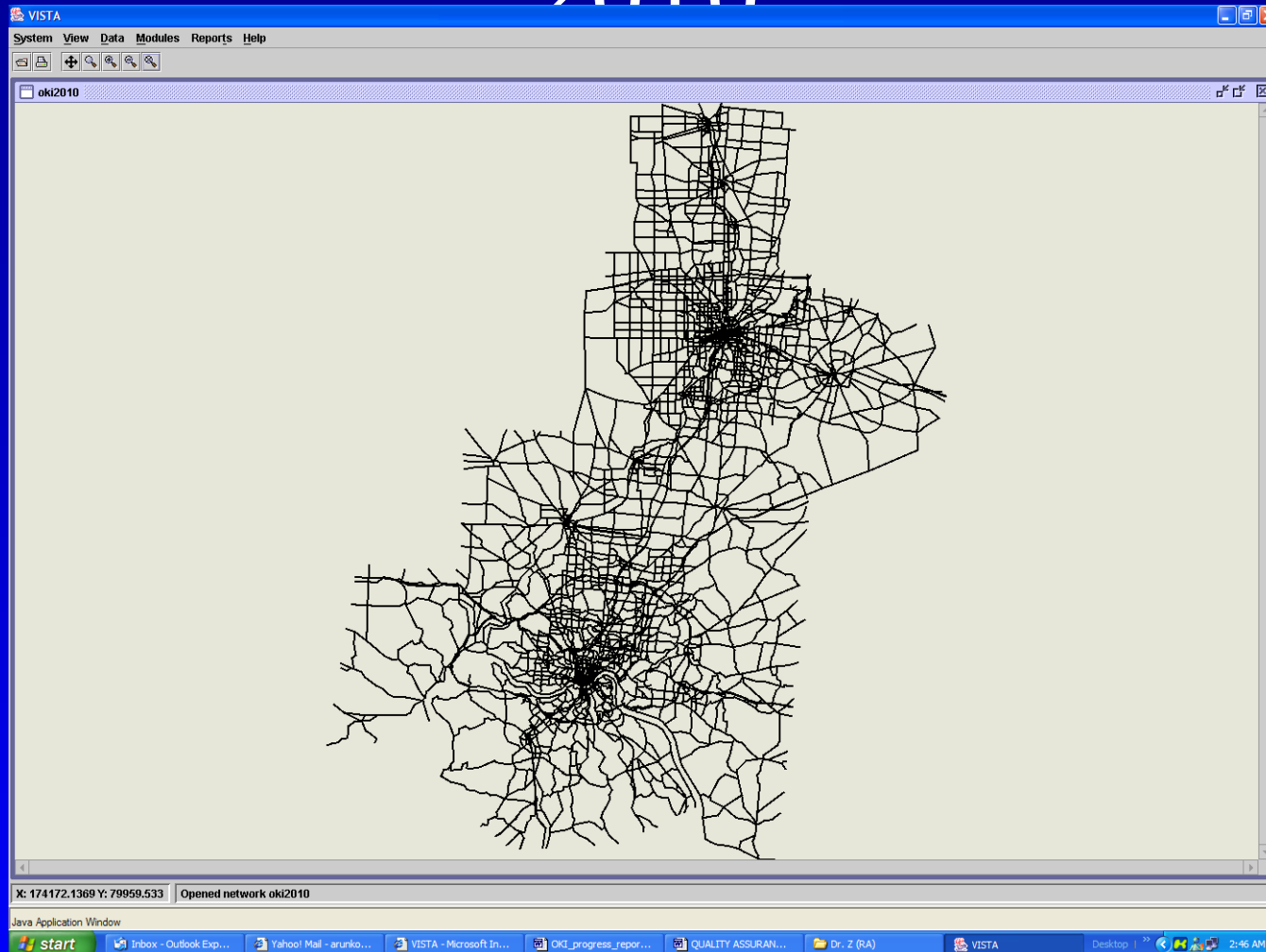
Click and drag to reposition the network view.



X: -87.5801 Y: 41.5339 Click and drag to reposition the network view.



Mill Creek, OH Network for Projected Year 2010





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Traffic Impact Study Process

- Local Corps office allocates funds
- LRC negotiates a scope of work and issues the work order
- Local office defines the affected area and provides data on locations and durations of flood closures for a full range of events
- NU builds the appropriate road network and obtains vehicle counts from the local planning agency
- NU and/or LRC run the various scenarios



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Traffic Impact Study Process

- LRC and/or the local office monetize the time and distance consequences in accordance with ER1105-2-100
- LRC and/or the local office compute average annual damages
- The local office uses output as an aid to plan formulation, or
- Proceed to with-project scenarios (new location and duration information)
- LRC and/or local office computes average





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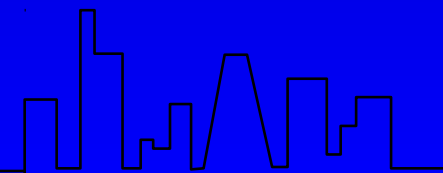


VISTA – Additional Applications

Emission Studies

The EPA MOBILE 6.2 module can be added to VISTA to estimate CO, NO_x, and TOG emissions levels for street segments and the overall network under a variety of conditions and constraints.

More detailed information is available.





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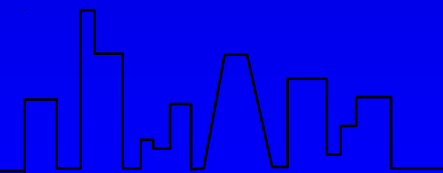


VISTA – Additional Applications

Road Deterioration Studies

The determination of additional damages to pavements due to the change in traffic patterns during flooding. AASHTO road test design equations are used.

More detailed information is available.





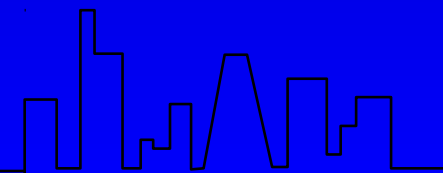
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VISTA – Additional Applications

Evacuation Planning

Traffic routing studies can be a valuable part of flood plain warning and evacuation plans. VISTA is already being used for emergency planning by local agencies.



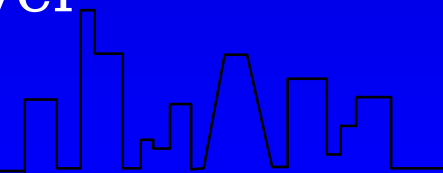


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Summary

- Traffic impacts can be a big component of annual damages
- State of the art methods are available to verify, analyze and report the damages and benefits
- The Chicago District is using a tested procedure and has an ID/IQ contract in place
- The Chicago District is trained in the execution of VISTA and has established working relationships at the working level





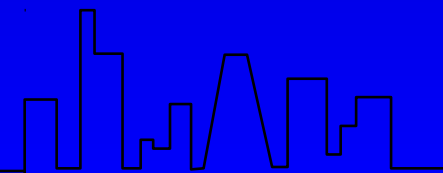
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For More Information VISTA Web Site:

<http://vista.civil.northwestern.edu>

A more technical presentation made to HQ and IWR is also available from the Chicago District





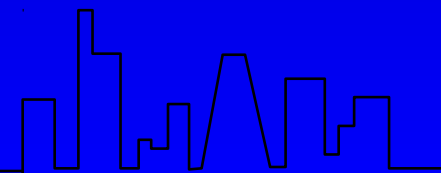
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Chicago District Contacts

Phillip Bernstein, Chief,
Planning

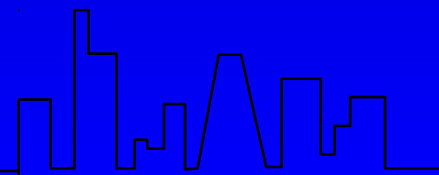
Gary Wickboldt, Chief,
Economics and Formulation

Dennis Giba, Economist





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